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Closing device

10 The present invention relates to a closing device for drawing shut a door, flap or hood or a lid, in particular a rear lid of a motor vehicle, having the features of the precharacterizing clause of claim 1.

15 A passenger car, in particular, generally has two or four side doors, an engine hood and a rear lid or a rear door which are in each case equipped with a lock which, for the purpose of closing the particular flap or door or the particular lid, interacts with a closing bracket which is fitted on a frame of the particular 20 door or of the particular lid. In the case of comfortable vehicles, one of the side doors or the tailgate can be equipped with a closing device which facilitates the drawing of the particular door or flap into the closing position. In order to close the rear 25 lid or the side door, the user has to pivot them to only until the lock can interact with the closing bracket. The remaining closing movement is then carried out automatically and independently by the closing device.

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A closing device of this type is advantageously fitted in a vehicle in conjunction with a driving device of a vehicle door (door, tailgate or rear lid), so that this driving device pivots the door until the lock interacts 35 with the closing bracket and the closing device then draws the door counter to the force of the deforming door seal into the closing position.

DE 39 00 508 A1 discloses a closing device of the type mentioned at the beginning and has a closing bracket carrier which carries a closing bracket and can be displaced between a standby position, in which the 5 closing bracket is extended, and a closing position, in which the closing bracket is retracted. Furthermore, a driving device is provided which drives the closing bracket carrier in order to displace it between the standby position and the closing position. In the case 10 of the known closing device, the closing bracket carrier has a protruding pin which can be displaced in a sliding manner in a guide groove. This guide groove is formed to a slide which is mounted in a manner such that it can be displaced transversely with respect to 15 the displacement movement of the closing bracket or of the closing bracket carrier, and forms part of the driving device. In this case, the guide groove is shaped in such a manner that the closing bracket carrier, which is positively coupled thereto via the pin, can be moved between the standby position and the 20 closing position during a displacement movement of the slide. The slide is driven in one direction with the aid of a cable pull and in the other direction with the aid of a restoring spring. The displacement movement of 25 the closing bracket or of the closing bracket carrier takes place in a purely translatory manner. For this purpose, the closing bracket carrier is mounted in a bidirectionally displaceable manner on a console which is fastened to the frame of the rear lid. The slide is 30 also mounted on this console. The cable pull for actuating the slide leads to a motor which is accommodated on a side wall in the trunk.

Another closing device of the type mentioned at the 35 beginning is disclosed in DE 42 30 985 C2 and likewise comprises a closing bracket carrier which has a closing bracket and can be displaced between a standby position, in which the closing bracket is extended, and

a closing position, in which the closing bracket is retracted. A driving device, also with a cable pull and a restoring spring, drives the closing bracket carrier in order to displace it between the standby position 5 and the closing position. In this embodiment too, the closing bracket carrier is mounted in a bidirectionally displaceable manner on a console. The closing bracket carrier is provided with a pin which engages in a guide slot. This guide slot is formed in a guide lever which 10 is mounted pivotably on the console. The guide lever forms part of the driving device, with the cable pull, on the one hand, and the restoring spring, on the other hand, engaging on the guide lever. The console is fastened to the frame of the rear lid, that is to the 15 edge of the trunk opening. A motor of the driving device is arranged at a distance therefrom at another suitable location in the trunk. In order to displace the closing bracket carrier, the guide lever is pivoted via the cable pull or via the restoring spring, in 20 which case the closing bracket carrier, which is positively coupled to it via the guide slot and the pin, is displaced in a corresponding manner between its closing position and its standby position.

25 The construction of the known closing devices is relatively complicated; in particular, the known closing devices require a relatively high outlay on installation. A particular disadvantage of the known closing devices is the fact that they require in each 30 case a relatively large installation space, with the consequence that the vehicle equipped therewith requires a special manufacturing process in the region of the frame, which is designed for the fastening of the console. For the situation in which a closing 35 device of this type is to be installed in the particular vehicle only as a special feature, this results in relatively high costs, since the frame which is provided for the attachment of a standard, fixed

closing bracket is not suitable for the attachment of the closing device or of the console thereof.

5 The present invention is concerned with the problem of specifying, for a closing device of the type mentioned at the beginning, an improved embodiment which, in particular, can be installed more easily and less expensively and permits better standardization particularly with regard to fixed closing brackets of
10 the same vehicle model.

This problem is solved according to the invention by the subject matter of the independent claim. Advantageous embodiments are the subject matter of the
15 dependent claims.

The invention is based on the general concept of using, for the fastening of the closing device, a closing bracket retaining section which is formed on the frame
20 of the door, flap or hood or of the lid and is provided for the fastening of a standard, fixed closing bracket, for which purpose the closing device is adapted in a suitable manner to this closing bracket retaining section. According to the invention, this adaptation
25 takes place by the closing bracket carrier being mounted on a bearing plate which is designed for fastening to a front side of the closing bracket retaining section while the driving device is designed for fastening to a rear side of the closing bracket
30 retaining section. The functional separation of the closing bracket carrier from the driving device enables the two components to be fitted on both sides of the closing bracket retaining section, thus making it possible, in particular, for construction space to be
35 saved. The adaptation of the closing device, which is conceived as a special feature, to the closing bracket retaining section, which is provided for a standard feature, makes it possible, during the installation,

either to attach the standard, fixed closing bracket or the closing device of the special feature to the closing bracket retaining section. Since no changes are therefore required on the bodywork, the closing device 5 according to the invention can be realized on a vehicle at reasonable cost.

According to one particularly advantageous embodiment, the closing bracket carrier can be mounted rotatably on the bearing plate and can be displaced between the standby position and the closing position by pivoting about a pivot axis. In this case, the closing bracket carrier has a driving arm which, with respect to the closing bracket, protrudes from the closing bracket carrier in a direction away from the pivot axis on a side of the closing bracket carrier that faces away from the pivot axis. In this embodiment, the driving device is provided with a driving element which is fastened to a carrier plate and interacts with an end section of the driving arm, which section is remote from the pivot axis, in order to pivot the closing bracket carrier. This carrier plate has a supporting arm which protrudes from the carrier plate in the direction of the pivot axis, an end section of the supporting arm, which section is remote from the driving element, being provided for fastening to the rear side of the closing bracket retaining section. By means of these measures, a rotatory displacement movement about an eccentric pivot axis is produced for the closing bracket. This special kinematics permits the use of other, hitherto unusable driving elements, as a result of which the complete closing device can be of very compact construction and, in particular, is fastened in complete form - apart from switches, 30 cables, power supply - to the closing bracket retaining section and, in particular, can be accommodated in the frame of the particular flap or hood or of the particular lid.

According to one development, in the fitted state, the closing bracket retaining section, the bearing plate, the closing bracket carrier, the driving arm, the 5 carrier plate and the supporting arm can extend in each case essentially parallel to a plane which runs perpendicularly with respect to the pivot axis. This design permits a particularly flat construction of the closing device. In this case, "flat" is understood as 10 meaning a relatively small dimension in the direction of the pivot axis; in particular, the closing device has a smaller size parallel to the pivot axis than transversely thereto.

15 A further advantageous embodiment is characterized in that, in the fitted state, the driving element, the supporting arm and the driving arm are arranged essentially along or in the vicinity of a straight line. These measures produce a relatively long 20 stretched-out construction for the closing device. In other words, the closing device is considerably larger in the direction of this straight line than transversely thereto. This construction makes it possible for the closing device according to the 25 invention to be accommodated particularly easily in a cavity in the frame of the particular lid or of the particular door or hood.

Further important features and advantages of the 30 invention emerge from the subclaims, from the drawings and from the associated description of the figures with reference to the drawings.

It goes without saying that the features mentioned 35 above and those which have yet to be explained below can be used not only in the respectively stated combination, but also in other combinations or on their

own without departing from the context of the present invention.

5 A preferred exemplary embodiment of the invention is illustrated in the drawings and is explained in greater detail in the description below, in which the same reference numbers refer to identical or functionally identical or similar components.

10 In the drawings, in each case schematically,

fig. 1 shows an assembled closing device in a side view,

15 fig. 2 shows an individual illustration of a driving device of the closing device,

fig. 3 shows an individual illustration of a closing bracket carrier of the closing device,

20 fig. 4 shows a side view of the closing device fitted into a frame,

25 fig. 5 shows a detail of a view as in fig. 4 but in a different viewing direction,

fig. 6 shows a view as in fig. 5, but with a fixed closing bracket,

30 fig. 7 shows a perspective view of the closing bracket from fig. 6,

fig. 8 shows a perspective view of a retaining plate of the closing bracket from fig. 6.

35 According to fig. 1, a closing device 1 comprises a closing bracket carrier 2 and a driving device 3. With the aid of the closing device 1, a lid (not

illustrated) or a door or flap or hood (not illustrated), in particular of a motor vehicle, can be drawn shut. The closing device 1 is preferably used in a passenger car for drawing shut the rear lid or trunk lid or the rear door. In principle, it is also possible for it to be used in a side door of a vehicle.

The closing bracket carrier 2 has a closing bracket 4 and can be displaced between the closing position (shown in figs 1, 3 and 5) and a standby position, which is raised with respect to the position of the closing bracket 4 and is indicated in fig. 1 by an interrupted line. Accordingly, in the standby position the closing bracket 4 is in a raised or extended state while, in the closing position, it takes up a retracted or lowered position. In this case, the closing bracket 4 interacts in a conventional manner with a lock which is accommodated in the particular door, flap or hood or in the particular lid. The driving device 3 is coupled in terms of drive to the closing bracket carrier 2 and drives the latter in order to displace it between the standby position and the closing position.

According to figs 1 and 3, the closing bracket support 2 is mounted on a bearing plate 5 which has at least one, here two, plug-in openings 6 into which fastening screws 7 (cf. figs 4 and 5) can be inserted. In the case of the preferred embodiment shown here, the closing bracket carrier 2 is mounted on the bearing plate 5 in a manner such that it can rotate about a pivot axis 8, so that the closing bracket carrier 2 can be displaced by pivoting between the standby position and the closing position by means of a rotational movement. The desired displacement travel for the closing bracket 4 is produced by a corresponding, eccentric arrangement of the same.

For at least one of the fastening screws 7, the closing bracket carrier 2 contains an advantageously elongated-hole-shaped aperture 9 which is shaped in such a manner that, in each relative position of the 5 closing bracket carrier 2, it overlaps one of the plug-in openings 6 in such a manner that the associated fastening screw 7 (cf. figs 4 and 5) can be fitted and is accessible through this aperture 9.

10 The closing bracket carrier 2 has a driving arm 10 which protrudes from the closing bracket carrier 2 in a direction leading away from the pivot axis 8. In this arrangement, the driving arm 10 and pivot axis 8 are formed, with respect to the closing bracket 4, on 15 mutually opposite sides of the closing bracket carrier 2. On its end section 11 facing away from or remote from the pivot axis 8, the driving arm 10 has a fork 12.

20 The closing bracket carrier 2 is designed in such a manner that it extends, apart from the closing bracket 4, in a plane which runs perpendicularly with respect to the pivot axis 8, and is situated parallel to the plane of the drawing. The closing bracket 4 protrudes 25 from the closing bracket carrier 2 perpendicularly with respect to this plane, i.e. parallel to the pivot axis 8. Furthermore, the fork 12, the closing bracket 4 and the pivot axis 8 lie essentially on a straight line which is not referred to specifically here.

30 According to figs 1 and 2, the driving device 3 has a driving element 13 which comprises, for example, an electric motor with a gear mechanism. The driving element 13 also comprises here a segmented gearwheel 14 35 on which a pin 15 is formed eccentrically with respect to the axis of rotation of the gearwheel 14. During a rotational displacement of the gearwheel 14, the pin 15 moves correspondingly on a circular path. In the

assembled state according to fig. 1, this pin 15
engages in the fork 12. By means of a rotation of
expediently 180°, the gearwheel 14 can pivot the
closing bracket carrier 2, which is positively coupled
5 thereto, between the closing position and the standby
position.

The driving element 13 is fastened to a carrier plate
10 16 of the driving device 3. This carrier plate 16 has a
supporting arm 17 which, in the assembled state
according to fig. 1, protrudes from the carrier plate
16 in the direction of the pivot axis 8. On its end
section 18 facing away from the driving element 13, the
supporting arm 17 has, for each fastening screw 7 (cf.
15 figs 4 and 5), a threaded opening 19 into which the
particular fastening screw 7 can be screwed. The
driving element 13, in particular also the gearwheel
14, the carrier plate 17 and the end section 18
thereof, are expediently also oriented here with
20 respect to a straight line. Furthermore, the carrier
plate 17 extends essentially likewise in a plane which
runs perpendicularly with respect to the pivot axis 8
and therefore parallel to the plane of the drawing.

25 In the assembled state according to fig. 1, the pin 15,
which engages in the fork 12, the fork 12, the closing
bracket 4 and the pivot axis 8 lie essentially on a
straight line.

30 According to fig. 4, the closing device 1 is installed
in a closing bracket retaining section 20 which is
formed in a cutout 21 in or on a frame 22 of the door,
flap or hood or of the lid which is to be drawn shut
with the aid of the closing device 1. In this case, the
35 frame 22 forms the boundary of an opening (not referred
to specifically) which can be closed with the aid of
the particular lid or with the aid of the particular

flap, lid or door. For example, the frame 22 forms the rear boundary of a trunk or loading compartment.

According to the invention, the closing device 1 is
5 installed in such a manner that the bearing plate 5 is
fastened to a front side of the closing bracket
retaining section 20, which side faces the observer in
figs 4 and 5. In contrast to this, the driving device 3
is fastened via the free end section 18 of the
10 supporting arm 17 to a rear side of the closing bracket
retaining section 20, which side faces away from the
observer. For this purpose, the closing bracket
retaining section 20 contains, for each fastening screw
7, a passage opening 23 into which the particular
15 fastening screw 7 can be inserted. In this case, the
bearing plate 5 and the supporting arm 17 are fastened
with the aid of the fastening screws 7 by the latter
being inserted from the side facing the observer into
the plug-in openings 6 of the bearing plate 5, through
20 the passage openings 23 of the closing bracket
retaining section 20 and into the threaded openings 19
of the free end section 18 of the supporting arm 17 and
are screwed therein. Of particular importance here is
the aperture 9 which has already been described further
25 above and through which a fastening screw 7 is
accessible and can be fitted.

So that the screwing of the bearing plate 5 and of the
supporting arm 17 to the closing bracket retaining
30 section 20 works, the arrangement of the plug-in
openings 6 and of the threaded openings 19 is formed
congruently to the arrangement of the passage openings
23.

35 As is revealed particularly clearly from figs 1 and 4,
in the fitted state, the closing bracket retaining
section 20, the bearing plate 5, the closing bracket
carrier 2, the driving arm 10, the carrier plate 16 and

the supporting arm 17 in each case run essentially parallel to one another and accordingly essentially perpendicularly with respect to the pivot axis 8, i.e., at least in fig. 1, also parallel to the plane of the drawing. Accordingly, the closing device 1 according to the invention is of relatively flat construction in the assembled state, i.e. the fitted closing device 1 is of a relatively small size in the direction of the pivot axis 8, in particular is smaller than in the directions running transversely with respect to the pivot axis 8.

Furthermore, it can be seen relatively easily from figs 1 and 4 that, in the fitted state, an essentially rectilinear orientation is produced for the driving element 13, the carrier plate 16 and the closing bracket carrier 2. Accordingly, the driving element 13, the supporting arm 17 and the driving arm 10 are arranged essentially along or in the vicinity of a straight line. This results in a long stretched-out construction for the closing device 1, i.e. the extent of the closing device 1 in this longitudinal direction is significantly larger than transversely thereto.

Overall, the proposed construction results in a relatively low requirement for construction space, with the result that it is possible, in particular, to accommodate the closing device 1, as here, in the frame 22.

According to fig. 5, a window 24 is provided in the region of the cut-out/recess 21 and the driving arm 10 is guided through it to the driving device 3.

Fig. 6 shows the same detail of the frame 22 in which the cut-out 21, in which the closing bracket retaining section 20 of the frame 22 is arranged, is formed. Instead of the closing device 1 according to the invention, a conventional, fixed closing bracket 25 is

fastened in fig. 6 to this closing bracket retaining section 20. In this case, this fixed closing bracket 25 is formed on a retaining plate 26 which is fitted to the front side of the closing bracket retaining section 20, which side faces the observer. A fastening plate 27 (illustrated by an interrupted line) is fitted to the rear side of the closing bracket retaining section 20, which side faces away from the observer. According to figs 7 and 8, the retaining plate 26 is also provided with two plug-in openings 28 while the fastening plate 27 contains two threaded openings 29. In this case, the plug-in openings 28 and the threaded openings 29 are again arranged congruently to the passage openings 23 of the closing bracket retaining section 20, so that the retaining plate 26 together with the fastening plate 27 can be screwed against the closing bracket retaining section 20 with the aid of the fastening screws 7 (cf. fig. 6).

20 It is of particular importance in the present invention that the closing device 1 is designed in such a manner that it can be fastened instead of the fixed closing bracket 25 or instead of the retaining plate 26 and the fastening plate 27 to the closing bracket retaining section 20. In the case of the preferred embodiment shown here, this means that the closing device 1 uses the two passage openings 23 of the closing bracket retaining section 20, which openings are provided per se for the attachment of the fixed closing bracket 25.

25 30 Whereas the fixed closing bracket 25 can be a standard feature of a motor vehicle that is provided as standard, the closing device 1 generally forms a special feature variant. Since no changes have to be carried out to the frame 22 or to the closing bracket retaining section 20 when the closing device 1 according to the invention is used, the closing device 1 can be fitted instead of the fixed closing bracket 25

in a particularly simple manner and at reasonable cost. In particular, it is basically also possible to retrospectively replace the fixed closing bracket 25 by the closing device 1 according to the invention.